

NON-PUBLIC?: N
ACCESSION #: 8808160456
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Byron, Unit 2 PAGE: 1 of 4

DOCKET NUMBER: 05000455

TITLE: Non-Safety Related Bus De-energized by Opening of Wrong Breaker
Resulting in a Reactor Trip
EVENT DATE: 07/14/88 LER #: 88-008-00 REPORT DATE: 08/09/88

OPERATING MODE: 1 POWER LEVEL: 095

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: G. Stauffer, Assistant Regulatory Assurance Supervisor

TELEPHONE #: 815-234-5441 Ext. 2280

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: The feeder breaker from the Unit Auxiliary Transformer to Non-Safety Related Bus 243 had been operating at elevated temperatures, and it was decided to rack the breaker out for a visual inspection. At 0110 on July 14, 1988, Unit 2 was at 95 percent power when the Nuclear Station Operator (NSO) closed the feeder breaker from the System Auxiliary Transformer and opened the feeder breaker from the Unit Auxiliary Transformer (UAT). The NSO turned away from the control panel to discuss placing the hot UAT feeder breaker in the pull-to-lock position with other licensed operators. When he returned to the control panel at 0113, he inadvertently operated the handswitch for the feeder breaker from the System Auxiliary Transformer which de-energized Bus 243. This resulted in the loss of several secondary side pumps including the 2B and 2C Main Feedwater Pumps. Steam Generator levels decreased rapidly and at 0114 an automatic reactor trip occurred due to low-low steam generator level. Plant conditions were stabilized in Hot Standby at approximately 0330.

The root cause of the event was a cognitive personnel error by the NSO, who inadvertently opened the wrong breaker that de-energized Bus 243. The hot breaker was caused by a thermostat failure in the breaker cubicle heater control circuit, which caused the cubicle heater to energize continuously.

Corrective actions include tailgate sessions with operators to discuss this event and emphasize the need for attention to detail in all control board manipulations. Additionally an evaluation of human factors involving the control room electrical panel will be performed to determine if improvements are warranted. The thermostat in the breaker cubicle heater control circuit has been replaced.

A previous similar occurrence was reported in Byron Unit 1 Licensee Event Report 85-034.

(End of Abstract)

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A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 7/14/88 / 0113

Unit 2 MODE 1 - Power Operation Rx Power 95%
RCS (AB) Temperature/Pressure Normal Operating

B. DESCRIPTION OF EVENT:

At 0001 on July 14, 1988, Byron Unit 2 was at 95 percent reactor power. The licensed operators on shift had contacted a Technical Staff engineer regarding the Unit Auxiliary Transformer feeder breaker to Non-Safety Related Bus 243 (breaker 2431) (EA), which had been operating at an abnormally high temperature. The engineer recommended that the power supply to Bus 243 be shifted to the System Auxiliary Transformer, and then breaker 2431 could be opened and racked out for a physical inspection. The Unit 2 Nuclear Station Operator (NSO) (a licensed reactor operator) reviewed the General Operating Procedure that provides direction for the routine shifting of power supplies from the Unit Auxiliary Transformer to the System Auxiliary Transformer. The Center Desk NSO, the Shift Engineer (a licensed senior reactor operator), and the Shift Control Room Engineer (SCRE) (a licensed senior reactor operator) were present with the Unit 2 NSO at the control room electrical distribution control panel for the performance of the power supply shift.

At 0110, on July 14, 1988, the Unit 2 NSO closed the System Auxiliary Transformer feeder breaker to Bus 243 (breaker 2432) and opened breaker 2431. The Unit 1 Shift Foreman (a licensed senior reactor operator) verified locally that the breakers operated properly. The Unit 2 NSO turned away from the panel to discuss placing the control switch for breaker 2431 in the pull-to-lock position prior to breaker rack

out. All four operators agreed that the switch should be placed in the pull-to-lock position. The Unit 2 NSO turned to face the control board. His intention was to move the breaker 2431 control switch through the trip position to the pull-to-lock position as discussed, however, he inadvertently moved the breaker 2432 control switch to the trip position at 0113. He realized the error immediately and attempted to close breaker 2432. Breaker 2432 remained open and Bus 243 de-energized.

When Bus 243 de-energized at 0113, power was lost to several secondary side pumps and auxiliary equipment. The 2B and 2C Turbine-Driven Main Feedwater Pumps (MFP) (SJ) tripped and Steam Generator (S/G) levels decreased rapidly due to the steam flow-feed flow mismatch. The Unit 2 NSO attempted to initiate a preset Main Turbine (TB) runback, but the Digital Electrohydraulic Control (JJ) panel was de-energized due to the undervoltage condition on Bus 243. The Shift Engineer directed the Unit 2 NSO to manually trip the reactor due to the lowering S/G levels, but at 0114 an automatic reactor trip occurred due to 2A S/G low-low level. The 2A and 2B Auxiliary Feedwater Pumps (AFP) (BA) started automatically in response to the low-low S/G level. An automatic Feedwater Isolation occurred as expected, when reactor coolant system average temperature (T(avg)) dropped below 564 degrees F following the opening of the reactor trip breakers. The Center Desk NSO reenergized Bus 243 from the System Auxiliary Transformer.

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B. DESCRIPTION OF EVENT: (Continued)

The licensed operators entered and complied with "Reactor Trip or Safety Injection - Unit 2 Emergency Operating Procedure" (2BEP-0) and "Reactor Trip Response - Unit 2 Emergency Operating Procedure" (2BEP ES-0.1). During the performance of 2BEP ES-0.1, at 0116, the operators noticed that the 2B AFP was not operating. The applicable Technical Specification Limiting Condition for Operation Action Requirement (LCOAR) was entered. An Equipment Attendant (non-licensed) was dispatched to investigate and found that the 2B AFP had tripped due to overspeed. At 0118 he reset the 2B AFP and the pump started automatically and operated normally for the duration of the event. The condenser steam dumps had been lowering T(avg) to its no load value of 557 degrees F as expected following the reactor trip and were fully closed, however, the reactor coolant system cooldown continued. At 0123 the 17 percent low pressurizer level setpoint was reached, an automatic letdown isolation occurred and the pressurizer heaters de-energized. The licensed operators isolated unnecessary steam loads in an effort to stop the cooldown. At about 0130 the Moisture Separator Reheater (MSR) (SB) reheat steam supply valves were discovered to be open and were continuing

to draw main steam. The valves were manually closed from the control board and T(avg) dropped to approximately 525 degrees F before the cooldown was stopped. At 0139 the low pressurizer level condition was cleared and at 1048 letdown flow was reestablished. The minimum pressurizer level during the event was 17 percent. At 0204 the 2B AFP was stopped since it was no longer needed to maintain S/G levels. At 0222 the Feedwater Isolation signal was reset and the Startup Feedwater Pump was started, but was not expeditiously aligned to supply feedwater to the S/G's because its suction relief valve lifted and remained lifted. Condensate/Condensate Booster Pump (SD) recirculation flow rates were increased, the suction relief was reseated, and flow was established from the Startup Feedwater Pump to the S/G's. At 0323 the 2A AFP was stopped. At approximately 0330 stable plant conditions were achieved with Unit 2 in Hot Standby.

This event is reportable due to the automatic Reactor Protection and Engineered Safety Feature (ESF) system actuations.

C. CAUSE OF EVENT:

The root cause of the event was a cognitive personnel error by the Unit 2 NSO, who inadvertently opened the wrong breaker that de-energized Bus 243. The Unit 2 NSO had correctly operated the control switches for two breakers. The sequence of control board manipulations was interrupted by further discussions with other operators in the Main Control Room, which caused the NSO to turn away from his panel. In order to complete the sequence of control board manipulations, the NSO returned to the panel and operated the wrong switch because he did not reverify the label for the switch. The personnel error is attributed to the NSO's lack of attention to detail.

The root cause for the abnormally high temperature condition of breaker 2431 was the failure of a heater control circuit that is used to keep the breaker cubicles warm during low room temperature conditions. Maintaining the breaker cubicles warm minimizes moisture accumulation in the breakers. The heater for the cubicle of breaker 2431 is located nearby breaker 2431, and therefore, indicated that the breaker itself may have been the heat source while the heater was energized.

The cause of the 2B AFP overspeed trip was a loose grounding terminal connection for the engine's speed sensing circuit. This resulted in a false, intermittent overspeed signal that caused the engine to trip.

The cause of the MSR reheat steam supply valves remaining open is that the Bus 243 outage caused the valves to fail in the as-is (open) position. Upon reenergization of Bus 243, the control circuitry reset

to the "MANUAL" condition which maintained the valves in the as-is (open) position.

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D. SAFETY ANALYSIS:

Neither plant nor public safety were affected by this event. With the exception of the 2B AFP, all ESF systems operated properly to minimize the consequences of the Bus 243 outage and resultant plant trip. Although the 2B AFP did not remain operating following its initial automatic start due to low-low S/G levels, the 2A AFP operated throughout the event and alone could have supplied all feedwater necessary to achieve a safe shutdown plant condition. The reactor coolant cooldown to approximately 525 degrees F resulted in no ESF actuations. The cooldown did not exceed any Technical Specification cooldown limitations, and reactor coolant inventory was always maintained since pressurizer level hovered at about 17 percent throughout the duration of cooldown. Had the cooldown continued because the operators could not locate the steam flow path, the operators could have manually initiated a Main Steam Isolation.

E. CORRECTIVE ACTIONS:

A Personnel Error Board was conducted July 15, 1988 to analyze the personnel error and develop corrective actions to prevent recurrence. Below are the corrective actions:

1. Tailgate sessions will be conducted with all operating shift personnel describing this event and emphasizing the need for attention to detail in all control board manipulations. Action Item Record (AIR) 455-225-88-0163 tracks completion.
2. The Assistant Superintendent of Operations will revise the "Conduct of Operations", as set forth in BAP 300-1, to provide definitive guidance on how to perform switch manipulations and use of verbatim "repeat back" communication. AIR 455-225-88-0163 tracks completion.
3. The Assistant Superintendent of Operations will conduct a review of the entire event progression to identify and address any weaknesses in the troubleshooting evolution of the hot breaker that led to the decision to switch power supplies. AIR 455-225-88-0163 tracks completion.

4. An evaluation of human factors involving the control room electrical panel will be performed to determine if improvements are warranted. AIR 455-225-88-0160 tracks completion.

5. This Licensee Event Report will be placed in the Licensed Operators required reading program.

6. The thermostat in the breaker cubicle heater control circuit has been replaced.

7. The loose terminal connections on the 2B AFP speed sensing circuit have been tightened fully to prevent recurrence. The pump was declared operable at 0031 on July 15, 1988, and the Technical Specification LCOAR exited.

F. PREVIOUS OCCURRENCES:

LER NUMBER TITLE

85-034 (Unit 1) Manual Safety Injection

G. COMPONENT FAILURE DATA:

a) MANUFACTURER NOMENCLATURE MODEL NUMBER MFG PART NUMBER

Not Applicable

ATTACHMENT # 1 TO ANO # 8808160456 PAGE: 1 of 1

Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

August 9, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv).

This report is number 88-008; Docket No. 50-455.

Sincerely,

/s/

R. Pleniewicz

Station Manager

Byron Nuclear Power Station

Enclosure: Licensee Event Report No. 88-008-00

cc: A. Bert Davis, NRC Region III Administrator

P. Brochman, NRC Senior Resident Inspector

INPO Record Center

CECo Distribution List

Ltr: BYRON 88-0742 (1921M/0206M)

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